

REMARKS/ARGUMENTS

The amendments to various claims to change "0.1 to 50%" to "0.1 to 20%" for both ratios (e.g. see Claim 1 and Claim 9) are supported by the preferable upper limit of the range described at page 13 of the specification and the originally claimed lower limit. For Claim 1, see page 13, lines 7-10; for Claim 5, see page 13, lines 12-16; for Claim 9, see for Claims 1 and 5. Evidence of patentability of the claims, as amended, is being provided in a Declaration under 37 CFR 1.132 filed herewith, as detailed below.

Claims 1, 3-4, 12, 24-26, 34, 38 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al (US PG Pub. No. 2003/0059647) (hereinafter, Thompson) in view of Lamansky et al (2002/0182441) (hereinafter, Lamansky) and further in view of Motomatsu (US Patent No 6,541,909) (hereinafter, Motomatsu).

Claim 1 is amended so that the content of the phosphorescent compound contained in hole blocking layer 1 (HBL 1) is in the range of 0.1 to 20% of the content of the

phosphorescent compound contained in the light emitting layer (hereinafter, referred to as "the content ratio of 0.1 to 20% in HBL 1").

With regard to Thompson, the Examiner states that "a content of the phosphorescent compound (Firpic) contained in hole blocking layer 1 is in the range of 0.1 to 50% of a content of the phosphorescent compound contained in the light emitting layer" in bridging pages of 2 to 3 in the Office Action.

However, "0.1 to 50%" as disclosed by Thompson is not a content ratio of the phosphorescent compound (Firpic) contained in hole blocking layer 1 to the phosphorescent compound contained in the light emitting layer as explained below.

Thompson teaches that "it is desirable that one or more layers of the device (such as for example the EL) comprise one or more dopants ([0098] of Thompson), and that dopants can be present in the host material in quantities ranging, for example, from about 0.1% to about 50%, from about 1% to about 20%, or from 1% to about 10%" ([0100] of Thompson).

Further, Thompson teaches that "blocking layers can also comprise dopants and that doping levels can range from about 1%

to about 50%, or more preferably from about 5% to about 20%, or even more preferably from about 10% to about 15% by weight" ([0109] of Thompson).

However, Thompson does not refer to the content ratio of the phosphorescent compound contained in a blocking layer to the phosphorescent compound contained in the light emitting layer.

In the Examples of Thompson, light emitting layers containing a phosphorescent compound are disclosed in the organic EL devices shown in Figs. 11A-11B and in Figs. 12A-12B of Thompson. However, no blocking layer containing a phosphorescent compound is included in such organic EL devices.

Accordingly, Thompson do not show or suggest a content ratio of 0.1 to 20% in HBL 1, as required by the present claims.

The secondary art does not provide the missing teaching. With regard to Motomatsu, the Examiner relies on this for teaching that the concentration of dopant is less in the hole blocking layer (7) than it is in the luminescent layer (4) (i.e. less than 50%).

Applicants disagree with the Examiner's conclusions, because, even if the concentration of dopant is less in the hole

blocking layer than it is in the luminescent layer, the concentration of dopant in the hole blocking layer can be more than 50% of that in the luminescent layer.

Motomatsu teaches that "it is preferable that a doped amount in the luminescent layer 4 is in a range of 1 to 10% by volume, and a doped amount in the doped layer 7 is in a range of about 0.6 to 6% by volume. As one example, when the doped amount in the luminescent layer 4 was set to 5%, a doped amount in the region where the electron transport layer 5a contacts the luminescent layer 4, or the doped layer 7 (the electron transport layer can work also as a hole blocking layer), was set to 3%" (Column 4, line 19-26 of Motomatsu). Namely, the preferable dopant amount in the doped layer 7 of Motomatus is 60% of the doped amount in the luminescent layer 4.

However, Table 3 in the 1.132 declaration filed herewith, clearly shows that the Emission Life and the External Quantum Yield are higher in the B/A range of 20% or less compared to those at the B/A value of 60% (see Organic El elements 1-11 to 1-17 in Table 3).

Such a small range of "the content ratio of 0.1 to 20% in HBL 1" is not shown or suggested by Motomatsu.

Lamansky teaches nothing about the content ratio of the phosphorescent compound contained in the hole blocking layer to the phosphorescent compound contained in the light emitting layer.

Accordingly, as can be seen from the above, "the content ratio of 0.1 to 20% in HBL 1" of claim 1 is not suggested nor motivated by a combination of Thompson, Lamansky and Motomatsu. Specifically, such a small range of "0.1 to 20%" is not taught or suggested. Nor would the results of meeting this parameter be expected.

Therefore, the rejection of claim 1 should be withdrawn.

Since claims 2-4 and 23-26 are dependent to claim 1, the rejections of these claims should also be withdrawn.

Claims 5, 7-8, 14, 18, 28-29 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson (647) (hereafter, Thompson as in the above arguments) in view of Yamazaki (US Patent No 6,580,213) (hereafter, Yamazaki), Epstein

et al. (US PG Pub. No. 2004/0043251) (hereafter, Epstein) and Motomatsu(909) (hereafter, Motomatsu as in the above arguments).

Claim 5 is amended so that the content of the phosphorescent compound contained in electron blocking layer 1 (EBL 1) is in the range of 0.1 to 20% of the content of the phosphorescent compound contained in the light emitting layer (hereinafter, referred to as "the content ratio of 0.1 to 20% in EBL 1"). This is the same change as made to Claim 1.

Referring to the discussion above concerning Thompson, Thompson do not teach or suggest the content ratio of 0.1 to 20% in EBL 1.

In relying on Motomatsu, the Examiner states that the concentration of dopant is less in the electron blocking layer (8) than it is in the luminescent layer (4) (i.e. it is less than 50%).

However, applicants disagree with this Examiner's conclusion, because, even if the concentration of dopant is less in electron blocking layer (8) than it is in the luminescent layer, the concentration of dopant in electron blocking layer (8) can be more than 50% of that in the luminescent layer.

Motomatsu teaches that "it is preferable that a doped amount in the luminescent layer 4 is in a range of 1 to 10% by volume, and a doped amount in hole transport layer is in a range of about 0.6 to 6% by volume. As one example, when the doped amount in the luminescent layer 4 was set to 5%, a doped amount in the region where the electron (should be "hole") transport layer contacts the luminescent layer was set to 3% (i.e., 60%)" (Column 5, lines 61-67 of Motomatsu).

However, Table 3 in the 1.132 declaration filed herewith provides evidence that the Emission Life and the External Quantum Yield are higher in the C/A range of 20% or less compared to those at the C/A valued of 60%. (See Organic El elements 1-18 to 1-26 in Table 3).

Such a small range of "the content ratio of 0.1 to 20% in EBL 1" is not taught or suggested by Motomatsu.

The additional secondary art, Yamazaki and Epstein, neither show nor suggest the content ratio of the phosphorescent compound contained in the electron blocking layer to the phosphorescent compound contained in the light emitting layer.

Accordingly, as detailed above none of the art shows or suggests "the content ratio of 0.1 to 20% in EBL 1." Combining the art does not result in relevant teaching. Therefore it is submitted that this range is not suggested nor motivated by the combination of Thompson, Yamazaki, Epstein and Motomatsu. Specifically, such a small range of "0.1 to 20%" is not taught or suggested.

Therefore, the rejection of claim 5 should be withdrawn.

Since claims 6-8 and 27-30 are dependent to claim 5, the rejections of these claims should also be withdrawn. Adding Wolk (applied with respect to Claims 6 and 19) for secondary features does not change this conclusion.

Claim 9 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson(647) in view of Motomatsu(909).

Claim 9 was amended as noted above including the same ratio limitation as was made in Claims 1 and 5 in the hole blocking layer and the electron blocking. The arguments above with respect to the lack of teaching in the combined art for Claims 1 and 5 applies here as well (see also discussion below).

Withdrawal of the rejection of Claim 9 is therefore respectfully requested.

Since the other listed rejected claims are dependent on claim 9, the rejections of these claims should also be withdrawn.

It is noted that claims 16, 18 and 20 are independent claims. The Examiner reasons that these are unpatentable in part on the position that "since the same material is taught in both layers (hole blocking and light emitting or electron blocking and light emitting) and the amount of material ranges from 0.1 to 50% of the light emitting layer then the emissions that occur would be within the range of 0.1 to 50% of the light emitting layer" (for example, page 14, lines 8-11 of the Office Action).

In each of Organic EL element 1-1 in Table 1 of the present Specification and Organic EL elements 1-11 to 1-17 in Table 3 of the 1.132 declaration filed herewith, the same phosphorescent compound Ir-1 is used in both the light emission layer and the hole blocking layer 1. However, the data for those organic EL elements in Tables 1 and 3 show that the ratio of the content of a phosphorescent compound contained in hole blocking layer 1 based on the content of a phosphorescent compound contained in the light

emitting layer, namely, B/A (%), of an organic EL element is not the same as the ratio of:

(Amount of phosphorescent emission in hole blocking layer 1)
/ (Amount of phosphorescent emission in light emission layer) x 100
of the same organic EL element.

The same discussion is applicable for the Organic EL Elements 1-19 to 1-26 in Table 3 of the 1.132 declaration.

Namely, it can be concluded that, in general, the ratio of phosphorescent emission amounts in a blocking layer and a light emitting layer cannot be deduced from the ratio of phosphorescent compound contents in the blocking layer and the light emitting layer.

Further, none of Thompson, Motomatsu, Yamazaki nor Epstein disclose the ratio of phosphorescent emission amounts in a blocking layer and a light emitting layer. Therefore, no combination can disclose this ratio or its importance and the rejections of 16, 18 and 20 should be withdrawn.

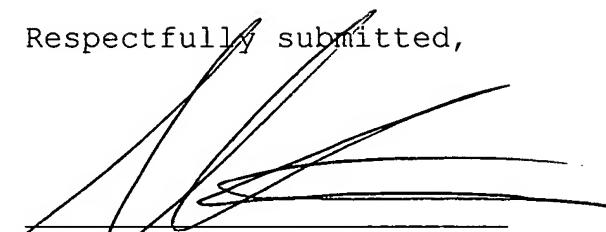
Accordingly, the rejections of all the claims dependent to claim 16, 18 or 20 should also be withdrawn.

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Withdrawal of the rejections and allowance of the applicants are respectfully requested.

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Encs. Petition for Two Month Extension of time
Form PTO-2038 - \$460
Declaration Under 37 CFR 1.132